



TITLE:

# A Study on the Decarburization of White Cast Iron. (I)

AUTHOR(S):

Morita, Shiro; Ono, Akira; Sakai, Toshikazu; Ogawa, Tatsuya

---

CITATION:

Morita, Shiro ...[et al]. A Study on the Decarburization of White Cast Iron. (I). 京都大学化学研究所報告 1950, 23: 63-64

ISSUE DATE:

1950-12-30

URL:

<http://hdl.handle.net/2433/74187>

RIGHT:

cryptol furnace and the tube is closed by water-jacket and 100cc/min purified CO gas is fed therein. The furnace is heated and kept at 1400°C for 3 hrs. The sample is quenched into water and the equilibrium component is determined.

#### 4) Reslts.

The experiments indicated that the sulphur equilibrium attained in 30 min. while Si equilibrium in 90 min. Thus the latter was found to need much more time than the former. Since the time depends on the viscosity and slag components, 1400°C was maintained for 3 hrs. in every run.

The experiments with various slags have proved that with the increase of basicity  $(S)/(S)$  increased,  $[C]_s$  also increased and  $[Si]$  decrease.

The quantitative correlation among  $(S)/(S)$ ,  $[C]_s$ ,  $[Si]$  and basicity is not determined from these results, but will be given by further experiments.

---

## 56. A Study on the Decarburization of White Cast Iron. (I)

*Shiro Morita, Akira Ono, Toshikazu Sakai and Tatsuya Ogawa.*

(Sawamura Laboratory)

This report is on the fundamental study for the method of a quick decarburization of white cast iron which clarified the relation between casting conditions and the decarburization velocity. White cast iron (C, 2.81 % ; Si 1.20 % ; Mn, 0.62 % ; P 0.21 % and S, 0.20 %) is melted in the Kriptol furnace, kept at the maximum temperature 1450°C for 10 min., and cast in the metallic, the green sand and the dry sand moulds at 100°C, 50°C and 10°C higher than the liquid temperature 1285°C respectively. Each of 9 samples (6 mm×50 mm) prepared as mentioned above is divided into two pieces, one being used for the microscopic study of as-cast structures and the other for the decarburization study. A piece (6 mm×24 mm) is placed in a porcelain boat, covered with mill scale which weighs about 68 % of the test piece and heated in the porcelain combustion tube previously displaced by the dried air and the volume of the gas generated at 1050°C is measured at certain intervals. The degree of the decarburization is calculated from the total volume of the gas, which is presumed to be consisted of carbon monoxide and carbon dioxide.

The volume of the gas generated is remarkably large for 3-4 hrs. from the start of heating, then gradually decreases and yet substantially large for about 9 hrs., until considerably decreases after about 10 hrs. and finally becomes constant every further hour. The results obtained are shown in the following table:

		Degree of Decarburization (%)								
		Metrllic Mould			Green Sand Mould			Dry Sand Mould		
		Casting Temperature (Above the Liquidus)								
C %	S %	100°C	50°C	10°C	100°C	50°C	10°C	100°C	50°C	10°C
2.62	1.37	89			71	66	65	83	94	81
2.65	1.74	95		80	885	81	70	90	83.5	80
2.57	1.46	92	90	85		82	86			74

From these results as mentioned above, it is considered that generally the higher the casting temperature, the greater the degree of the carburization, and the degree of the decarburization is greater in the order of the metallic, the dry sand and the green sand mould, respectively.

## 57. Method of Quantitative Analysis of Nitrogen Contained in Cast Iron. (V)

*Hiroshi Sawamura, Masatoshi Tsuda and Keiji Omura.*

(Sawamura Laboratory)

In this report, we first studied the extraction percentage of HCl soluble Mn in the cast iron. (this Bulletin 20, (1950) 52).

Sample; Gray Cast Iron Wt.; 5 grs. (report III).

Apparatus; J. E. S..

HCl solution; 90c.c. of 6N-HCl.

Decomp. Temp.; about 110°C.

Decomposition Duration of Time; 15, 30, 60, 120, 180 min.

Results; Given in Table I.

Table I

Decomp. Time (min)	15	30	60	120	180
Mn (%)	78.38	84.61	100.00	100.00	100.00

Then we determined the nitrogen % in the HCl insoluble residue. For the HCl decomposition, "Gakushin" and H. Kempg's methods were adopted.

We determined the completion of the decomposition by the extraction % of Si, Ti, etc in the residue. As a sample, was taken the decomposition residue treated by 6N HCl solution at about 110°C for 60 minutes.

At the N-analysis in this experiment, filter paper was used instead of asbestos as generally used except in the experiments of the best result.